COLLUSION VERSUS EFFICIENCY IN THE JAPANESE REGIONAL BANKING INDUSTRY*

By WILSON A. ALLEY

This paper uses a behavioural approach to test the hypothesis that Japan's regional banking performance is primarily the result of efficiency and is best described by the efficient structure hypothesis as opposed to the structure-conduct-performance hypothesis. Our model allows us for the first time to estimate the degree of (implicit) collusion in the Japanese regional banking industry. This paper finds that significant collusion does occur. This result leads us to conclude that the structure-conduct-performance hypothesis better explains Japan's regional banking performance.

1. Introduction

If an industry's profitability is found to be positively correlated with its level of concentration, it is normally argued that the firms of that industry are in active collusion. But is this really the case? It is if the firms are in active collusion; but an industry's profitability and level of concentration will also be positively correlated if the firms operate efficiently. This paper tests the hypothesis that regional banking performance in Japan is primarily the result of efficiency and is not due collusion, i.e., the 'abuse' of market power. In effect, we will test two competing hypotheses; the structure-conduct-performance (SCP) and the efficient structure (ES) hypotheses.

According to the SCP hypothesis, a highly concentrated market structure is assumed to be more conducive to effective collusion as higher seller concentration lowers the cost of collusion and fosters tacit or explicit collusion on the part of firms. This hypothesis, however, fails to explain how and why an industry became concentrated. Even so, if a positive correlation between performance and market concentration is found to exist, researchers argue that superior performance is the result of collusion.

Based on the work of Demsetz (1973), Peltzman (1977), and Brozen (1982), the ES hypothesis, however, argues that an industry's structure is determined by the efficiency requirement of equilibrium; i.e., whatever industry structure minimises total costs is the only structure consistent with industry structure in the long-run. Thus the resultant structure can be best described as a 'natural' oligopoly structure and can be considered endogenous. If firms in an industry operate according to a production function exhibiting economies of scale, there would be a natural tend-

* I would like to thank Professors Yoshinori Kon and Hiroshi Ono and an anonymous referee for valuable comments in the course of this work. I would also like to thank Monbusho (Japanese Ministry of Education) for giving me the opportunity to study in Japan. This paper is based on my Master thesis at Otaru University of Commerce, but is substantially revised. The usual disclaimer applies.
ency over time for the larger firms to be more successful and for the industry to become more concentrated. Accordingly, market structure and profitability will be positively correlated.

While a significant body of literature exists overseas that investigates the banking industry’s market structure and performance relationship, research that investigates the Japanese banking industry’s structure-performance relationship is minimal and has to date been based solely on the SCP hypothesis. Royama and Tsutsui (1987), using the structure-performance hypothesis, found interest rates and profits were positively correlated with market concentration. Tsutsui (1988) tested the SCP and expense-preference hypotheses and concluded interest rates and bank profits were positively correlated with market concentration, while market concentration was found to be positively correlated with higher technical efficiency. Most recently, Mori and Tsutsui (1989), using a theoretical approach, simultaneously test the SCP and expense-preference hypotheses. They also concluded that higher interest rates, bank profits, and technical efficiency are associated with higher market concentration.

While these results seem to support the SCP hypothesis, they also seem somewhat contradictory. While indicating a higher degree of collusion occurs in more concentrated markets, concentrated markets are more efficient in the production of financial services. Thus these results seem to be more in line with the ES hypothesis, which argues that higher profits and market concentration are the result of superior efficiency, than the SCP hypothesis. In none of the research conducted to date, neither efficiency, nor some measure of efficiency, has been directly incorporated into the models used; the effect of regulation on banks’ performance has not been fully taken into account; and market structure has been treated as if it is exogenous to the model.

This paper differs from other research to date in that the ES hypothesis, rather than the SCP hypothesis, is assumed to provide a better explanation of the banking industry’s structure-performance relationship. To test the ES hypothesis, because it is difficult to measure efficiency directly, we must measure it indirectly. Smirlock uses a modified version of the traditional SCP hypothesis to test the two competing hypotheses for the U.S. banking industry. This paper, however, examines the banking industry’s structure-performance relationship using a behavioural approach. Using this approach, the type of collusive behaviour that occurs in an oligopolistic bank market is explicitly modelled; enabling us to calculate the degree of collusion and banks’

1) All three papers test the SCP hypothesis for Japanese regional banking market, composed of Regional and Sogo (Secondary Regional) banks and Credit Associations, using cross-sectional data for the 1982 financial year. All three use the Herfindahl index as their measure of industry concentration.

2) In order to directly measure the efficiency, it is more appropriate to estimate the cost function. The cost function, however, will not be estimated in this paper.

3) The SCP hypothesis argues that

$$\pi_{OBS} = \pi_C + a(\pi_M - \pi_C)CR$$

where $\pi$ is profit, $CR$ a concentration ratio, and the subscripts OBS, C, and M are observed, perfectly competitive, and monopoly profits respectively; and $0 < a \leq 1$. That is, to what degree do observed profits differ from their competitive levels as a result of higher market concentration. Based on this argument, the basic empirical model used normally takes the form,

$$\pi = a_0 + a_1CR + \sum_{i=2}^{N} a_iZ_i,$$

where $Z$ is a vector of additional control variables that are argued to affect bank profits.
non-cooperative profit level. The results are then compared to those obtained using Smirlock's model.

2. Theoretical Framework

In order to test the SCP and ES hypotheses simultaneously, Smirlock (1985) suggests the following model:

\[ \pi = a_0 + a_1 MS + a_2 CR + a_3 MSCR + \sum_{i=4}^{\infty} a_i Z_i. \]

where \( \pi \) is a measure of profit, \( MS \) is market share, \( CR \) is a measure of market concentration, \( MSCR = MS \times CR \) is an interaction term, and \( Z \) is a vector of additional control variables. Although Smirlock fails to provide a theoretical justification for this model, he argues that if \( a_1 > 0 \) and \( a_2 = 0 \) this supports the ES hypothesis as this implies that banks with higher market shares are more efficient than their rivals and thus earn economic profits as a result of superior efficiency. The result \( a_1 = 0 \) and \( a_2 > 0 \), however, supports the SCP hypothesis as it implies that market share does not effect profits and thus economic profits are the result of collusion. An interaction term, \( MSCR \), is included should \( a_1, a_2 > 0 \). In this case, if \( a_3 \leq 0 \) this supports the ES hypothesis as profits are the result of efficiency and no collusion occurs. If high concentration is associated with collusive behaviour and characterised by disproportionate profit sharing in favour of the larger banks, then a positive coefficient on \( MSCR \) should be observed.

Market share, however, may appear in the profit equation simply because each bank faces only a part of market demand.\(^4\)\(^\text{4) Noted by a referee of this journal.} Moreover, as will be shown later, the coefficient on market share includes a measure of market power. Accordingly, the result \( a_1 > 0, a_2 \geq 0, a_3 \leq 0 \) does not necessarily support the ES hypothesis as argued by Smirlock.

Based on the work of Clarke and Davies (1982), our model allows us to test the two competing hypotheses while explicitly incorporating a behavioural assumption about other banks' response to a change in behaviour of a bank in an oligopolistic bank loan market. We will assume a banking industry that consists of \( T \) banks, where bank output is loans, and deposits are treated as inputs. Accordingly we can write the profit equation of the \( n \)-th bank, neglecting the required reserve on deposits, as

\[ \pi_n = i_L L_n - c_n(L_n) - F_n, \]

where \( \pi_n \) is profit, \( L_n \) is the output of the \( n \)-th bank, \( i_L \) is the loan interest rate, and \( c_n \) and \( F_n \) are variable and fixed costs of the \( n \)-th bank respectively. The loan interest rate, \( i_L \), is a function of total market loans; i.e., \( i_L = i_L(L) = i_L\left(\sum_{n=1}^{T} L_n\right) \) (the inverse demand function). We will assume banks are profit maximisers, and neglecting the problem of potential entry, the first-order condition for a maximum is

\[ \partial \pi_n / \partial L_n = i_L + L_n i'_L(L)(\partial L / \partial L_n) - c'_n = 0, \]

\( ^4 \) Noted by a referee of this journal.
where $c'_n$ is marginal cost and

$$\frac{\partial L}{\partial L_n} = 1 + \partial \sum_m \frac{L_m}{\partial L_n} = 1 + \lambda_n;$$

i.e., $\lambda_n$ is the total change in output by $m$ banks (where $m \neq n$) in response to a change in output by bank $n$. Dividing through by $i_L$ and rewriting we obtain

(4)  \[ i_L [1 - (1/\eta)(L_n/L)(1 + \lambda)] = c'_n, \]

where

$$\eta = -(i_L/L)(\frac{\partial L}{\partial i_L}),$$

i.e., $\eta$ is the interest rate elasticity of demand.

$\lambda_n$, however, needs some qualification. We will assume that perfect (implicit) collusion occurs; i.e., each bank believes that all other bank will react to output changes so as to maintain their market shares. That is, bank $n$ assumes $\frac{L_m}{L_m} = \frac{L_n}{L_n}$ for all $m$; and thus

$$\lambda_n = \partial \sum_m \frac{L_m}{\partial L_n} = \sum_m \frac{L_m}{L_n} - 1,$$

where $m \neq n$. Although this is banks' conjecture, from experience and given the bank industry is relatively stable, we can assume that banks' expected and the actual reaction of rivals are the same.

In order to 'parametise' a range of behaviour; Clarke and Davies suggest a specification for $\lambda_n$, which takes the form,

$$\frac{L_m}{L_m} = \alpha (\frac{L_n}{L_n})$$

for all $m \neq n$, $0 < \alpha < 1$.

Thus the parameter $\alpha$ (assumed to be the same for all $n$) represents the degree of implicit collusion inherent in the market; i.e., $\alpha$ is the proportionate extent to which each bank believes that other banks will react to a change in output. Accordingly, lower values of $\alpha$ imply that banks believe that there is some scope for improving their market share as rivals will not react proportionately. Hence as $\alpha$ approaches 0 we tend to the Cournot case; while perfect collusion is approached as $\alpha$ tends to 1. Thus

$$\lambda_n = \alpha \left(\sum_m \frac{L_m}{L_n}\right) = \alpha [(L/L_n) - 1].$$

Thus, we can rewrite the original equilibrium condition (equation (4)) as

$$i_L [1 - (1/\eta)[(L_n/L) - \alpha (L_n/L) + \alpha]] = c'_n$$

Rearranging and noting $L_n/L$ is market share, $MS$, we obtain

(5)  \[ \frac{i_L - c'_n}{i_L} = \alpha/\eta + [(1 - \alpha)/\eta]MS, \]

i.e., the mark-up of price over marginal cost, Lerner's index of monopoly power, is related to the degree of collusion, market share and (inversely to) the price elasticity of demand. Observed margins, however, can be expected to deviate from their natural level for a variety of reasons arising from various disturbances; e.g., market growth and regulations. For this reason a vector of additional control variables will be included when estimating the model. Assuming constant
marginal costs, empirically equation (5) takes the form

\[ \pi / REV = a_0 + a_1 MS + \sum_{i=2}^{N} a_i Z_i, \]

where \( REV \) is bank revenue, \( a_0 = \alpha / \eta \), and \( a_1 = (1 - \alpha) / \eta \). Given that \( a_0 + a_1 = 1 / \eta \), the value of \( \alpha \) can be easily estimated.

Rewriting equation (5) as

\[ (i_L - c_n') / i_L = (1 / \eta) MS + (\alpha / \eta)[1 - MS], \]

we can estimate the degree to which profits deviate from their non-cooperative level. If no collusion occurs, \( i.e., \) as \( \alpha \) approaches 0, then \( (i_L - C_o) / i_L \) approaches \( (1 / \eta) MS \). Thus if no collusion occurs, and profitability is positively correlated with market share, then this is the result of greater efficiency by banks with larger market shares. If perfect collusion occurs, \( i.e., \) as \( \alpha \) approaches 1, then \( (i_L - C_o) / i_L \) approaches \( 1 / \eta \). Thus \( (\alpha / \eta)[1 - MS] \) can be thought of as the degree to which profits diverge from their non-cooperative level as a consequence of collusion; \( i.e., \) the 'abuse of market power' component of profitability.

Although we have shown that market share and profitability are related, in order to distinguish between the ES and SCP hypotheses it is necessary to test to see how pronounced the relationship between the degree of collusion and market concentration, if any, is. According to the SCP hypothesis, collusion is a function of market concentration, \( i.e., \alpha (CR) \), and thus we expect \( \alpha \) to be positively correlated with market concentration. According to our model, in the absence of collusion, the slope of the market share-profit relationship is determined by \( \eta \) and is not related to the level of market concentration. Thus a non-positive relationship between \( \alpha \) and concentration favors the ES hypothesis. As non-linear forms have been found to better describe the concentration-collusion relationship (see Geroski (1981)), the equation to be estimated is

\[ \alpha = \phi + \beta_1 CR + \beta_2 CR^2. \]

Although a non-linear relationship is found to be more appropriate, the linear case; \( i.e., \alpha = \phi + \beta CR \), is interesting in that if this is substituted into equation (5), we obtain

\[ (i_L - c_n') / i_L = \phi / \eta + ((1 - \phi) / \eta) MS + (\beta / \eta) CR - (\beta / \eta) MSCR; \]

which is similar to Smirlock's model once a vector of additional control variables is added. From equation (7) we know the non-cooperative profit level is given by \( (1 / \eta) MS \) and thus the 'abuse of market power' component of profitability is \( (\phi / \eta) - (\phi / \eta) MS + (\beta / \eta) CR - (\beta / \eta) MSCR. \) Ac-

\[ \pi / REV = a_0 + a_1 MS + a_2 (F/REV) + \sum_{i=3}^{N} a_i Z_i, \]

When the model was run, however, in all cases the fixed cost over revenue variable was insignificant and no improvement in R-sq was observed. For this reason the \( F/REV \) variable was not included in the final model.

In order to estimate equation (8) the individual \( \alpha \)'s for each prefecture had to be recovered. Unfortunately most prefectures contain only 1 Regional and Sogo bank. Thus due to insufficient data, only the data of 12 prefectures which contained three or more banks was used. Moreover, due to the small number of observations in each data set, equation (6) was estimated without the vector of additional control variables.

---

5) Given \( (i_L - AC) / i_L = (i_L - c_n') / i_L - (AC - c_n') / i_L \) and \( AC - c_n' = F_n / L_n \), where \( AC \) is average costs; the original equation to be estimated took the form

\[ \pi / REV = a_0 + a_1 MS + a_2 (F/REV) + \sum_{i=3}^{N} a_i Z_i, \]

When the model was run, however, in all cases the fixed cost over revenue variable was insignificant and no improvement in R-sq was observed. For this reason the \( F/REV \) variable was not included in the final model.

6) In order to estimate equation (8) the individual \( \alpha \)'s for each prefecture had to be recovered. Unfortunately most prefectures contain only 1 Regional and Sogo bank. Thus due to insufficient data, only the data of 12 prefectures which contained three or more banks was used. Moreover, due to the small number of observations in each data set, equation (6) was estimated without the vector of additional control variables.
cordingly, the coefficient on the market share variable includes a measure of market power of $-(\phi/\eta)MS$. Therefore a positive market share coefficient does not prove that firms with 'larger' market shares are more efficient. Furthermore, the existence of a non-linear concentration-collusion relationship implies that Smirlock’s model is not correctly specified.

Our model to be estimated contains a vector of additional control variables, $Z$. Vector $Z$ will consist of five control variables. Number of bank branches, $BR$, is included to account for the Ministry of Finance’s (MOF) branch guidance policy which effectively restricts banks’ behaviour. The coefficient on this variable should be positive. A dummy variable, $REG$, is included to take account of any effects that regulation separating banks activities may have. 0 is assigned to Regional banks while 1 is assigned to Sogo (presently called Secondary Regional) banks. The sign of this variable is indeterminable. Market growth, $GROW$, is included as it is often argued that increased profits opportunities exist in a growing market for existing banks; although its effect is dependent on the rate at which supply grows to satisfy increases in demand. This coefficient should be non-negative. Market size, $Y$, is included to account for increased profit opportunities that may exist in a larger market. However, as more banks tend to exist in larger markets, banks are forced to act more competitively. Thus the sign of the coefficient is indeterminable. Lastly, total bank loans, $L$, is included as a scale factor to account for any differences in profit margins due to size. The sign of this coefficient is indeterminable as although increases in output (loans) decrease interest rates, the net effect on profit margins is dependent on the degree to which economies of scale exist.

3. Data

Following Tsutsui (1988, p. 179), we will assume that each regional banking market forms a market that is segmented and isolated from other prefectures. Our market to be tested is a regional or prefectural one, consisting of Regional and Sogo banks and Credit Associations. City and Trust banks and public financial institutions have been excluded from the analysis. Although this assumption is somewhat controversial, it is based on the observation that the Ministry of Finance (MOF) restricts the establishment of Regional and Sogo bank branches to within, or adjacent to where their head offices are located. Needless to say, each prefectural banking market does interact with adjacent markets through the operation of branches locating outside of their home-prefecture and through City banks which have country-wide branch networks. We will assume, however, that such interaction is so weak that we may disregard it.

Our model, as determined by our market to be tested, consists of observations for a 106 Regional and Sogo banks belonging to 41 prefectures. Six prefectures, Tokyo, Osaka, Aichi, Hokkaido, Saitama, and Hyogo prefectures were excluded as City banks account for the dominant proportion of deposits and loans in these prefectures. Moreover, although Credit Associations’ data was used to calculate the relevant market shares and concentration ratios for each prefecture, as profit and cost data was not available, they will not be included in the regression analysis. To allow for regulated interest rates, we assume that the effective interest rate on loans is flexible.

7) Although the model was run with total outstanding loans, the model was also run with total outstanding deposits used as a scale factor. In all cases the same results were obtained.
The Economic Studies Quarterly

The definitions of variables are as follows. $\pi$ are current profits before tax. $CR$, the Herfindahl index, and $MS$ are calculated for each prefecture based on the outstanding deposits of Regional and Sogo banks and Credit Associations in each region. $Y$ is Prefectural income and $L$ is outstanding loans at the end of each financial year. The necessary data was obtainable from two main sources; (1) Todofukubetsu Keizai Tokei (Prefectural Economic Statistics) issued by the Bank of Japan's Department of Research and Statistics; and (2) Ginkokyoku Kinyu Nenpo (Department of Banking's Financial Yearbook) issued by Ministry of Finance's Department of Banking. Data was used for the 1986 and 1987 financial years. Although a longer time span is desirable to smooth out any irregularities particular to a given year, given that the Japanese financial system is currently in the throes of deregulation, a shorter time span is preferable due to the changing nature of the financial system.

4. Empirical Results

For comparative purposes, we will first estimate Smirlock's model. Looking at equation (9) of Table 1, the market share variable is positively and significantly correlated with profit margins at the 10% level; while the concentration variable, $CR$, although positive, has no significant effect on profits. Given $MSCR$, the interaction term, is also insignificant, according to Smirlock, this result supports the ES hypothesis.

Looking at the other variables, the regulation variable is significantly and positively correlated with profit margins at the 10% level. Recall that a dummy variable was used with 0 being assigned to Regional banks and 1 for Sogo banks. At first glance this would suggest that Sogo banks profit margins are higher than those of Regional banks. This, however, is unlikely. Rather, this variable can be interpreted as the degree of protection in favour of Sogo banks. This is based on the observation that Sogo banks tend to be favoured over other banks in banking policy by the MOF in, for example, branch guidance. This suggests that Sogo banks face a higher degree of protection compared to Regional banks. The importance of this favouritism is shown by the $BR$ variable, number of branches of a bank, which is positively and significantly correlated with profits at the 10% level.

Meanwhile, market growth, $GROW$, is positively correlated with profit margins at the 10% level; and bank size, $L$, is negatively correlated with profits at the 5% level. This suggests that banks charge higher margins in times of growth and that ‘larger’ banks' profit margins are smaller. Market size, $Y$, however, is insignificant.

We will now turn to look at the results yielded by our behavioural model. Looking at equation (10), market share is positively correlated with profit margins at the 1% level. For the other variables, e.g., $REG$ and $GROW$, the same results as those yielded by Smirlock's model were obtained.

Using equation (10), we can recover the values of $a$, the degree of collusion, and $\eta$, the interest rate elasticity of demand. The estimated values of $a$ and $\eta$ are 0.6013 and 10.03 respectively. A high degree of collusion appears to occur. Furthermore, the interest rate demand elasticity is highly elastic. This may seem overly high, but recent experience suggests this is not unrealistic. When the Long-Term Credit Bank of Japan offered bank debentures of 10 years that carried a comparatively high yield in October 1990, it had to turn away customers who wanted to buy
Table 1

<table>
<thead>
<tr>
<th>Equation (9): $\pi/REV = 0.05416^{**<em>} + 0.06094^{</em>} + 0.01068$</th>
<th>$a_0$</th>
<th>$MS$</th>
<th>$CR$</th>
<th>$CR^2$</th>
<th>MSCR</th>
<th>REG</th>
<th>GROW</th>
<th>BR</th>
<th>Y</th>
<th>L</th>
<th>R-sq</th>
<th>adj R-sq</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(-0.708)</td>
<td>(1.934)</td>
<td>(1.826)</td>
<td>(1.928)</td>
<td>(1.131)</td>
<td>(-2.306)</td>
<td></td>
<td></td>
<td></td>
<td>0.1312</td>
<td>0.0970</td>
</tr>
<tr>
<td>Equation (10): $\pi/REV = 0.05997^{<em><strong>} + 0.03977^{</strong></em>}$</td>
<td></td>
<td>(1.934)</td>
<td>(1.789)</td>
<td>(2.361)</td>
<td>(1.006)</td>
<td>(-2.405)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.1290</td>
<td>0.1035</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equation (11): $\alpha = 2.3423^{**}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.4475</td>
<td>0.3247</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *, ** and *** indicate that the coefficients are significant at the 10, 5, and 1 percent levels respectively, and ( ) are their estimated t values. $n$ is the number of observations.
debentures.

We are also able to calculate the non-cooperative profit level as recall this is equal to \((1/\eta)MS\). Thus the non-cooperative profit level for each bank is \(0.09974 \times MS\), or approximately one-tenth of market share. As a proportion of profits, this was found on average to explain 31.85%, or approximately a third of banks' profits. This suggests that on average, bank profits are three times their non-cooperative level as a result of banks abusing their market power.

Lastly, equation (11) shows the relationship between the degree of collusion and market concentration. Differentiating equation (11) with respect to market concentration, \(CR\), yields

\[
\frac{\partial \alpha}{\partial CR} = -9.9269 + 24.944CR.
\]

Thus the degree of market collusion is positively correlated with market concentration when \(CR \geq 0.4\). Furthermore, the non-linear relationship between market concentration and the degree of collusion suggests that Smirlock's model is not correctly specified.

5. Conclusion

The aim of this paper was to test the hypothesis that Japan's banking industry's performance is the result of competitive, rather than collusive behaviour. Before discussing the implications of the results obtained, however, a few points should be noted. Firstly, we have looked at only one segment of the financial system as City and Trust banks, and other financial institutions were excluded from the model. The effect of bank branches which are located outside their home prefecture was also not taken account of. Secondly, the Japanese financial system is currently in the process of deregulation. Given the gradual progression of liberalization of the Japanese financial system, however, it is unlikely this has had any sudden distorting effect on bank profits or market structure. Lastly, although the effects of separation of banking business and branch guidance were taken account of in the model, the effect of regulated interest rates on profitability and market structure was not.

The results obtained using Smirlock's model and argument lead us to incorrectly accept the ES hypothesis. The results obtained from our behavioural model indicate a high degree of collusion occurs, and this causes profits to deviate from their non-cooperative level. Due to the significant constraining effect regulation has on bank behaviour, banks are not able to take full advantage of any economies of scale and/or scope that exist and hence they are not as efficient as they could be. Furthermore, regulation by reducing competition, may actually encourage collusion to occur. Nevertheless, given the current nature of regional banking in Japan, this leads us to reject our hypothesis and conclude that the SCP hypothesis better describes the market structure-performance relationship in Japanese regional banking.

The results of this paper differ with the results of other research to date in that the degree of collusion in the banking industry was calculated and this was shown to be positively correlated with market concentration for markets where \(CR \geq 0.4\). Given that significant collusion does occur and regulation's constraining effect on bank's behaviour, then financial policy that restricts

---

8) As pointed out by a referee of this journal.
W. A. Alley: Collusion versus Efficiency in the Japanese Regional Banking Industry

bank size is inappropriate and unnecessary.  

(Hokkaido University)

First draft received August 19, 1991; final draft accepted April 8, 1992.

REFERENCES